Layer 00 Issues/Status

Run2b Silicon Task Force

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Key Concerns

- cables
  - capacitance
  - pick-up
  - crosstalk
- running at small radius
  - machine related noise
  - occupancy from beam losses
  - occupancy from physics

Cable Capacitance

- test measurements have always been in good agreement with calculated capacitances
- measured noise is as expected from capacitances and SVX3d characteristics

Cable Pick-up

Significant common mode noise:

similar to silicon...

- all environmental

  $\Rightarrow$ easily eliminated in shielded box

  with $\geq\approx$5mm between cable and wall

- space prohibits this level of shielding

  for Layer 00

- grounding does help

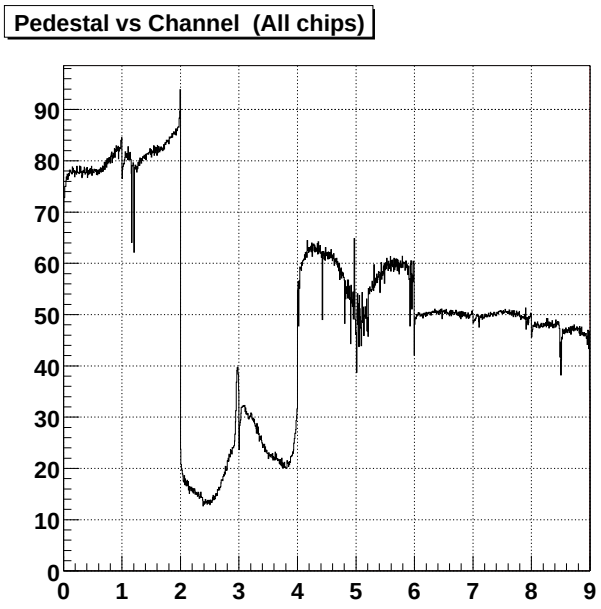
- DPS

still, pickup introduces shape to pedestal and noise distributions

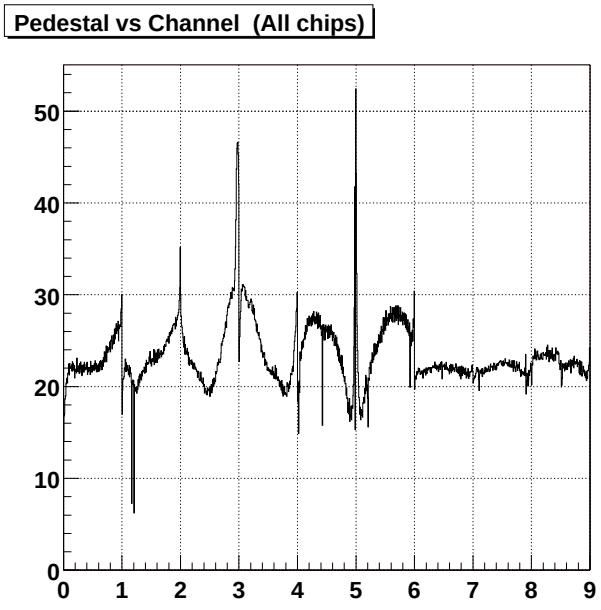
$\Longrightarrow$ not easily addressed.

Layer 00 Pedestals

DPS off

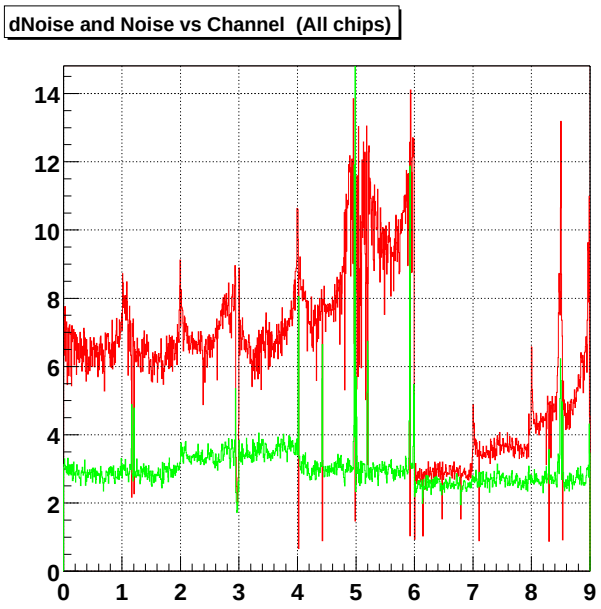


DPS on

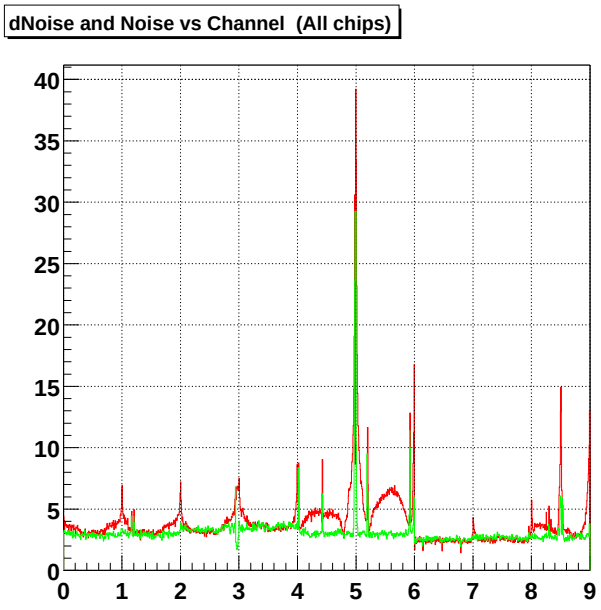


Layer 00 Noise

DPS off



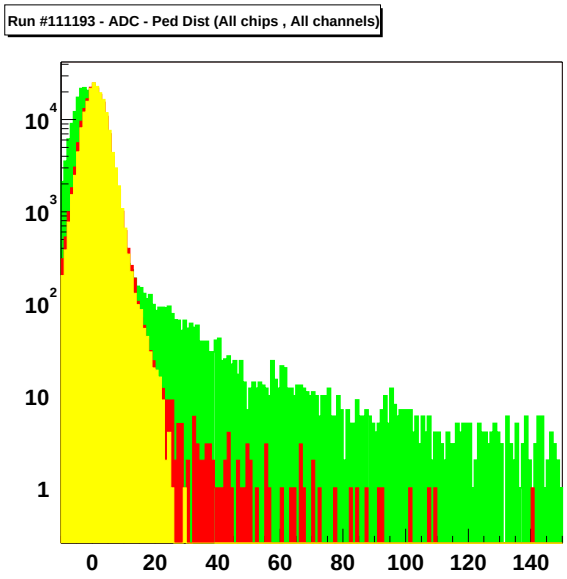
DPS on



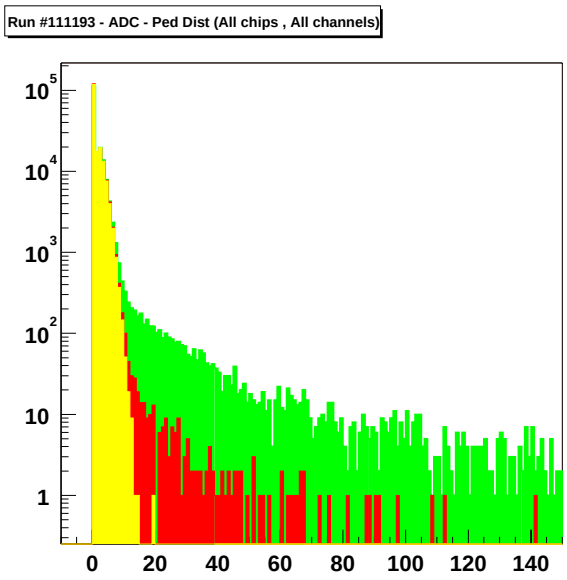
Layer 00 Charge Distributions

“physics bucket”, “bucket before” and bucket after

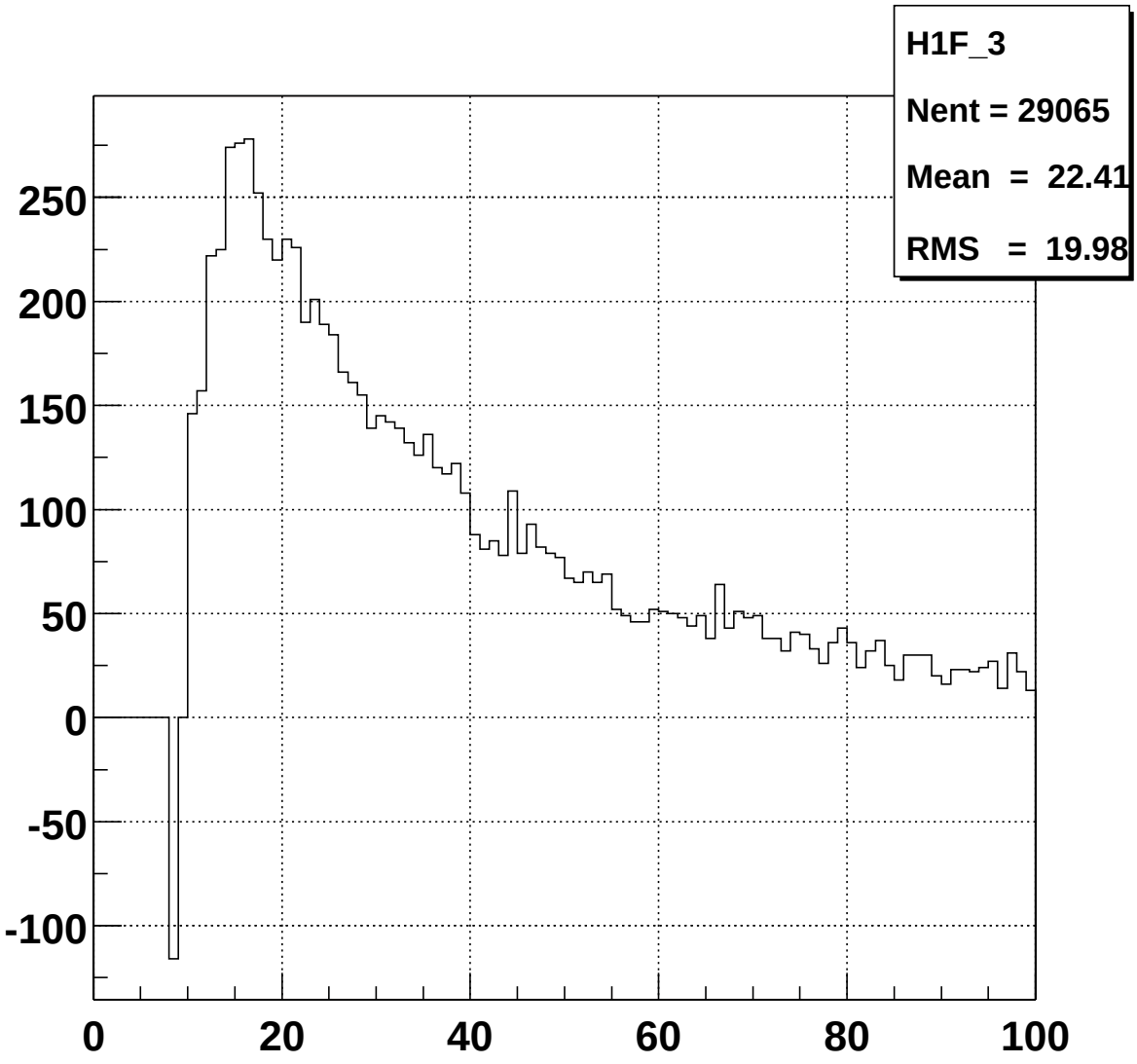
DPS off



DPS on



Layer 00 Cluster Charge



Timing needs tuning

Crosstalk

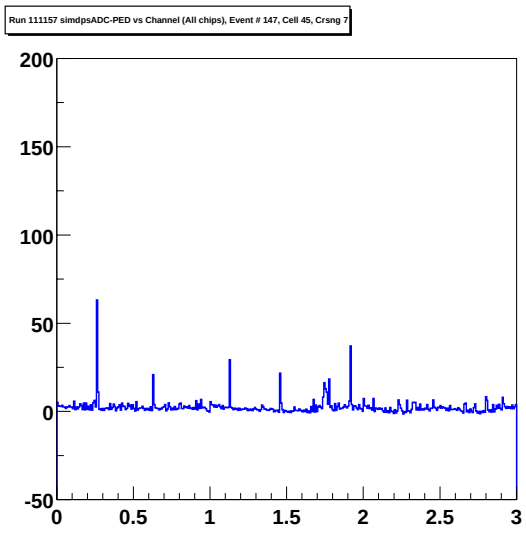
Measured on laser test stand at SiDet:

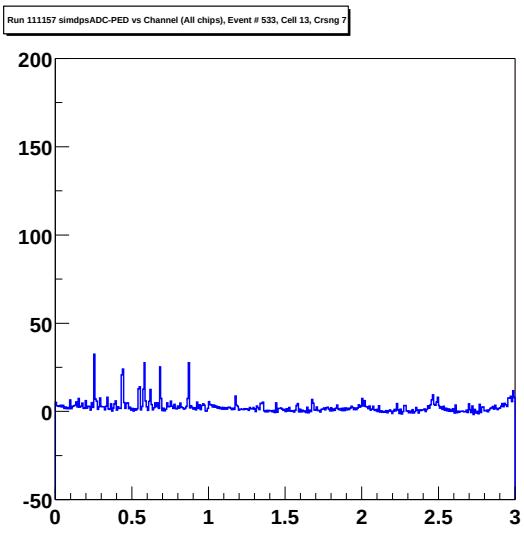
$\Longrightarrow$ 5-7% of charge on pulsed channel is found on neighbors

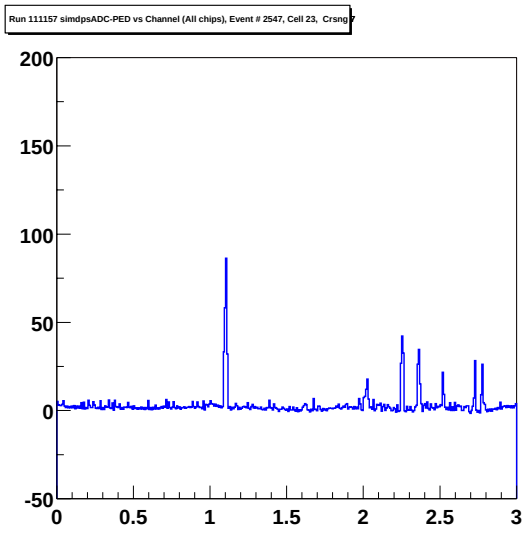
Machine Noise

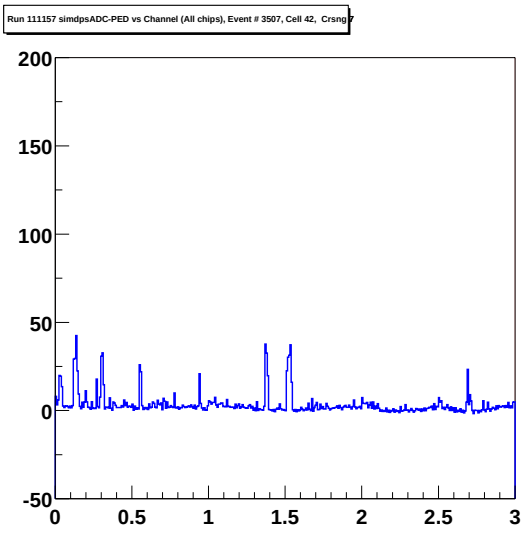
We observe no obvious new noise sources with Tevatron in operation

Occupancy – The Good

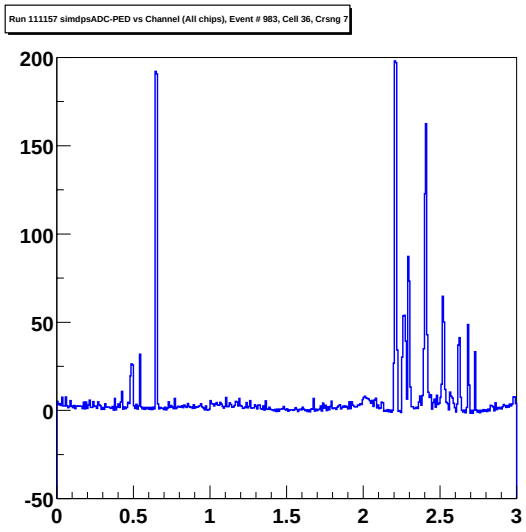


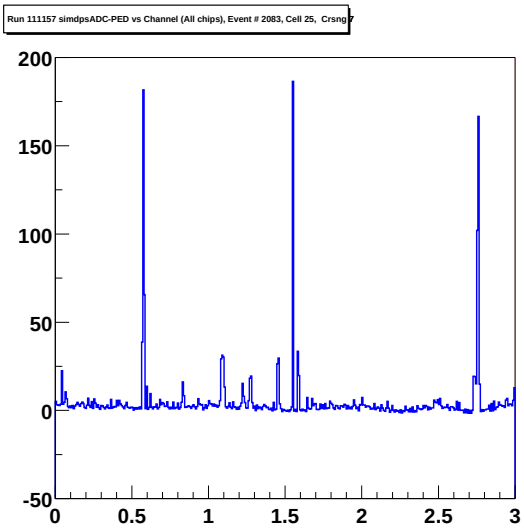


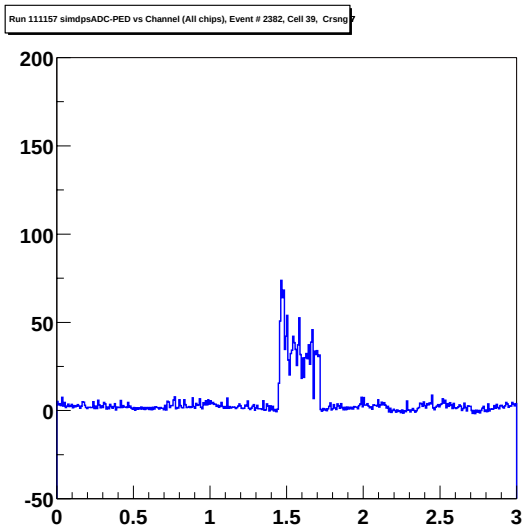


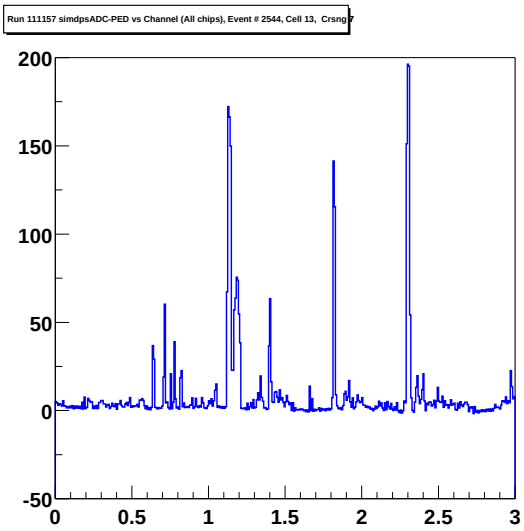


Occupancy – The Bad

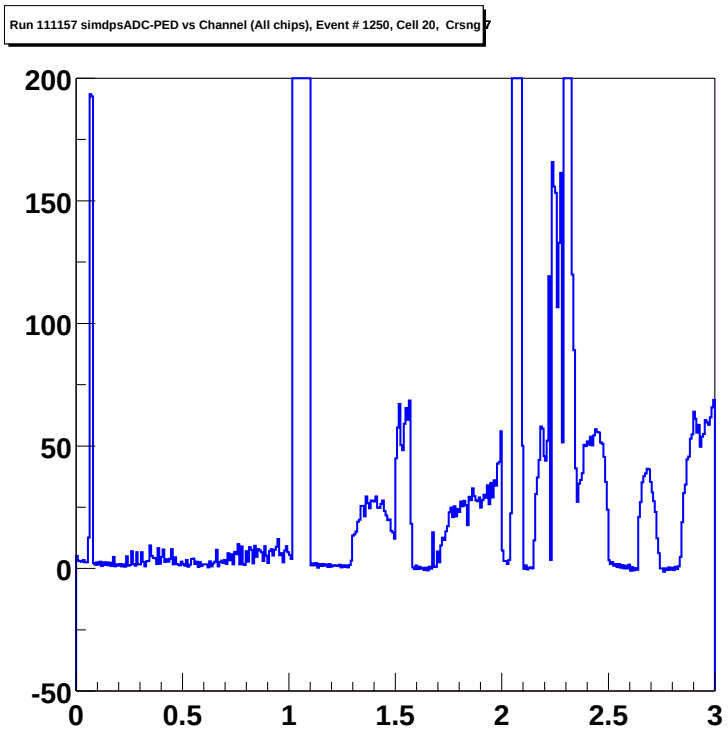


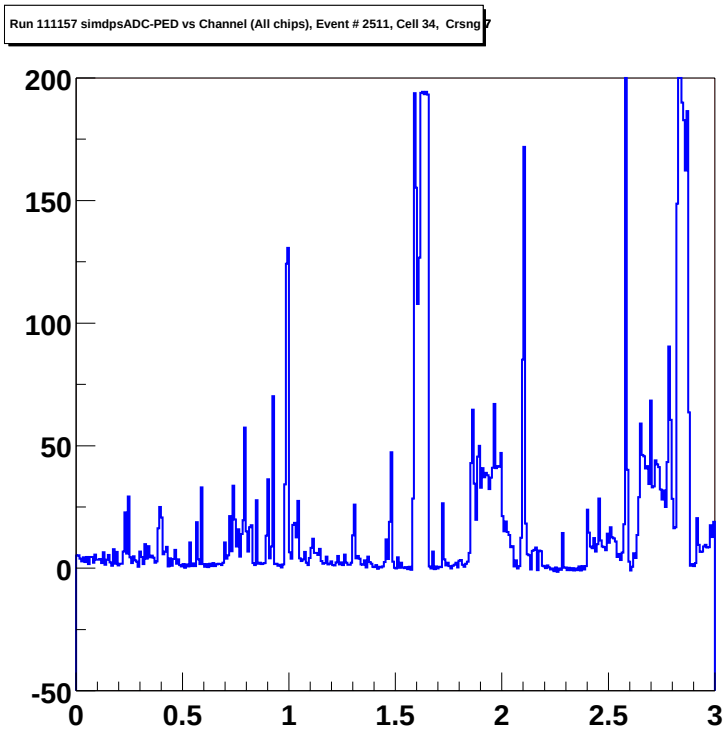






Occupancy – The Ugly



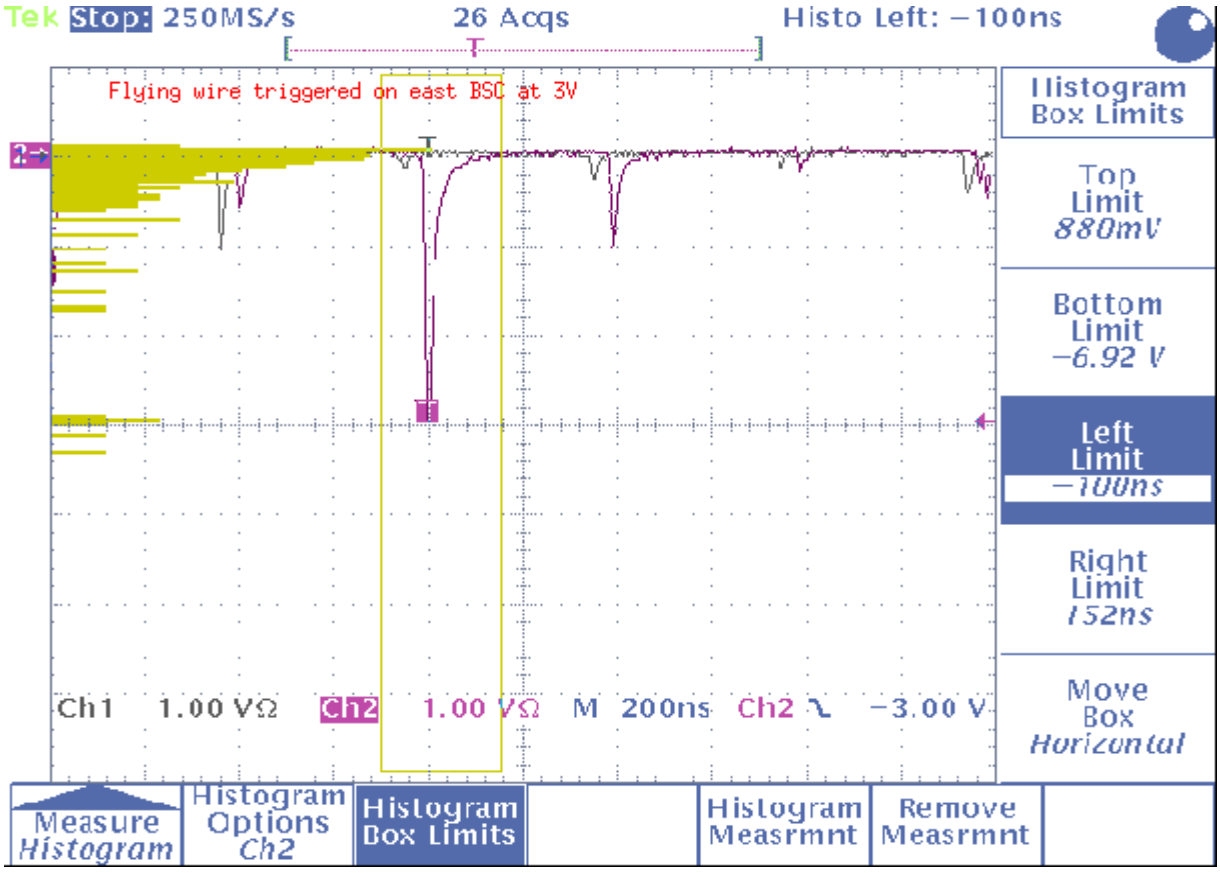


Beam Shower Counters

- Scintillators around beampipe
- $|z|$=6.5m
- 5.5$<|\eta|<$7.5
- typically used to measure beam loss **rate**
- **hits from losses are out of time with those from collisions**

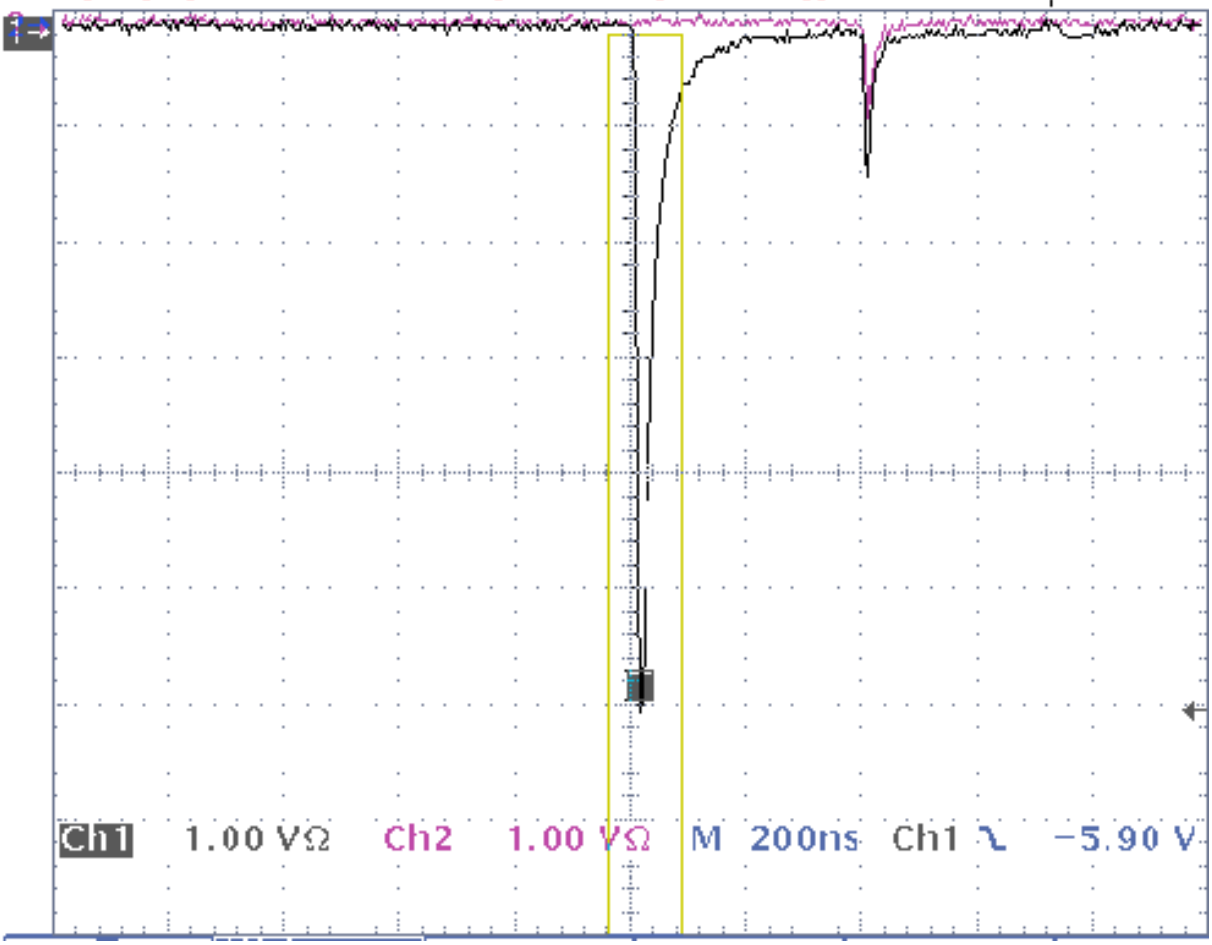
connected output to an oscilliscope to get more detailed view of beam losses

BSC – Beam Losses and Flying Wires

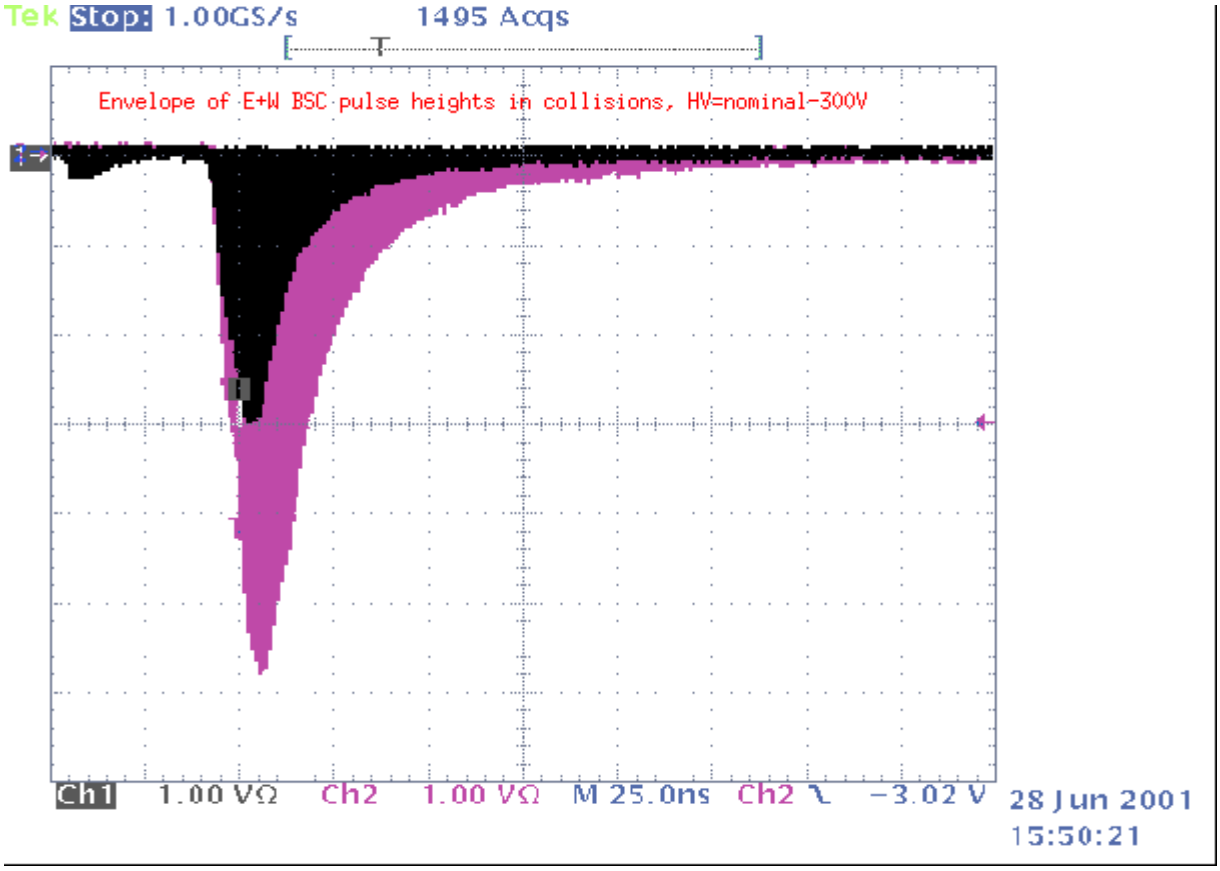


BSC – Collisions

Sample trigger during collisions. Trigger on west BSC at 5.9V. Nominal HV.
During flying wires, these settings did not give a trigger.



BSC – Collisions and Beam Losses



Deposition in BSC from losses is small compared to physics

Conclusions

- cable-related noise is managable – a little more room in Run2b will go a long way toward eliminating this
- Layer 00 timing still needs tuning for optimal charge collection
- We have an idea what min-bias looks like: mostly OK.
- What looks ugly is all physics: a few mm larger radius will not make much difference....